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WATER DEVELOPMENT PROJECTS IN ISRAEL

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WATER DEVELOPMENT PROJECTS IN ISRAEL

[Except for the first article in Part I, all articles in this report are from the following Tel Aviv Dailies: Al Hamishmar, 19 November, and 22 and 30 December 1959; Davar, 4 and 7 January, 23 February, 3 March, 4 and 21 April, and 18 and 20 May 1960; Haaretz, 18 November 1959, and 13 January, 1 April, and 12 May 1960; Lamerhav, 25 November, and 7 and 31 December 1959; Omer, 19 November, and 2 and 18 December 1959, and 25 February 1960; Letzte Nyes, 15 November 1959, and 12 February and 1 April 1960. Most titles given are composites, reflecting the theme of translations of different articles. The centered elipses indicate that what follows is from a different article. Source information for the first article in Part I is given below.]

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PART I

I. STUDY OF ISRAELI WATER PROBLEMS

[Following is a translation of an article by Aharon Wiener, official of the Tahal and Mekorot water companies, in the quarterly periodical Mada, Jerusalem, Vol 3, No 2, April 1959, pages 26-29.]

The importance of water in the household and in agriculture is recognized by all. But even the intelligent reader does not generally give any thought to the great importance of water in industrial production, and he will perhaps be surprised to learn that to manufacture one ton of paper -- a very dry item -- requires 300 cubic meters of water. An even drier item, iron, consumes 300 cubic meters of water in its production. This applies to a large number of our industries, whether in operation or in the planning. The future industrial development of the country will thus become increasingly dependent upon the adequate supply of water necessary for industrial production. Although we think of water today as one tied up mainly with agricultural needs, there is no doubt that in the next few years industry will emerge as agriculture's serious rival for every cubic meter of water that might be found in Israel.

Water as a Detering Factor

In the final analysis, water is the determining factor in agriculture as well as in industry. The problem before us is how to make the fullest possible use of the water resources we have, and how to derive from the existing supply of water the maximum possible advantages.

The major consumer of water in the country today is agriculture. This is very significant inasmuch as Israel has never been a naturally-irrigated land and in the past whatever did grow in the country was mainly from rainfall. Artificially-irrigated stretches throughout the ages have only been found in the vicinities of springs and rivers. The introduction of modern engineering methods at the beginning of this century has given a forward push to the great development of artificial irrigation in this country.

Nevertheless, there are natural factors which limit the development of the country's irrigation system, and, to a certain extent, its entire economic development as well. These factors are:

a) The total potential output of all useable water sources in Israel is estimated at 1,800,000,000 cubic meters annually. After taking care of the needs of the communities and industries, the remainder of the supply will be sufficient to irrigate only 2,100,000 dunams of land of the 5,000,000 suitable for artificial irrigation.

b) The distribution of the water sources are not adequate. For example, north of the Yarkon (including the Yarkon itself) are located 85% of the sources and only 50% of the irrigable soils, whereas south of the Yarkon where the remaining 50% of the irrigable land is located there are only 15% of the water sources.

c) Most of the water is located in low layers in the earth or streams flowing through low valleys. It therefore becomes necessary to bring it up by pumping to an average height of 80 meters to the places of consumption and irrigation. Necessary, too, is the proper pressure for the sprinklers, water towers, etc. Thus the full utilization of Israel's water resources involves an expenditure of from L.I. 20,000,000 to L.I. 30,000,000 for the installations of power pumps alone.

Careful Planning Necessary for Utilization of Water

On studying these hindering factors one arrives at the following conclusions:

a) The development of irrigation (as well as the development of industry) is limited by the amount of available water from all sources in this country. It is, therefore, necessary to plan irrigation based on the principle of obtaining the most possible in produce per cubic meter of water. At the same time we must expedite the creation of a governmental authority to regulate the exploitation of the country's water resources.

b) Inasmuch as the potential water output is not sufficient for all irrigable areas, it will be necessary when the master plan is drawn, to devise such a method of distribution of the water that would assure the maximum agricultural advantages.

c) The great distance between the water sources and the irrigation areas and the average low level where the water is found render the cost of the water very expensive (particularly by comparison to the rates in countries with natural irrigation). The high cost of the output of the water and channeling it to the consumer, and the fact that water is a raw material of a limited quantity, necessitate that the plan for the irrigation installations and the methods of irrigation must forever be predicated on the principle of most rigid conservation.

Our Water Resources

From all that was said above, it becomes obvious the water authority in Israel cannot copy and adopt the same methods used in classical irrigation lands, such as Egypt, Iraq, Syria, and others. We must give full consideration to the problems peculiar to our country and to adjust our plans to meet these problems.

The need for a master plan to include all water resources in one general frame had been felt even before the establishment of the State. During World War II work was begun on a countrywide water program which achieved its final form in recent years.

This program considers a potential water output of 1,800,000,000 cubic meters of water annually, as per the following table:

Source of water	Output in millions of cubic meters	% of the total supply of water
From rivers	700	39%
From springs	250)	14%
From subterranean and returning waters	640) --	
From floods and purified drainage water	210	12%
Totals	1,800	100%

Two-thirds of the total annual output of 1,800,000,000 cubic meters of water can be gauged directly or indirectly. The remaining third consists of subterranean sources, the quantity of which cannot be measured directly and may only be estimated indirectly.

The Present Water Demand

In 1958 over 1,200,000,000 cubic meters of water were produced which constituted more than two-thirds of the full potential quantity. The sources exploited were mainly subterranean and springs, whereas river waters, flood water and the other sources had not been utilized to any appreciable degree.

About three-fourths of the water output was consumed by agriculture and the remaining fourth by the urban communities and industry.

Existing water installations concentrate primarily on subterranean water. It is a fact that in the southern part of the country the exploitation of the subterranean waters had reached the allowable maximum and in some areas even surpassed it -- around Tel Aviv, for instance. In the central portion of the country the use of water exceeded the warranted maximum, but a few water sources remain in its northeastern section open for development. Only in the country's northern region (north of Haifa) there are still to be found in appreciable quantities of subterranean waters that could be developed.

Water Needs In the Years Immediately Ahead

From the above, it is clear that, with the exception of the northern region and parts of the central section, no more subterranean water sources remain in the State open for large-scale development. Future deployment will, therefore, concentrate on finishing the work on utilization of the Yarkon and Jordan Rivers. At a later stage the efforts will turn to the exploitation of flood and purified drainage waters.

In 1947 250,000 to 300,000 dunams of our country's land was irrigated artificially. Water consumption at that time may be estimated to have been 300,000,000 - 350,000,000 cubic meters approximately. Since then the artificially irrigated area has jumped, reaching 1,300,000 dunams, which water consumption for farming, urban use and industry exceeds 1,250,000,000 cubic meters annually. [Note: The text, page 29, column 1, first paragraph, gives the last figure as 1,250,000 -- obviously a typographical error. M.H.K.] This rapid growth was made possible primarily through a number of large and medium projects, the largest of which is the Yarkon-Negev Project, operated by the Mekorot Company. In spite of the rapid progress attained in recent years, however, many great efforts will be demanded of us. Taking into account the natural growth of the population and immigration, it will be essential to increase by 50% the artificially irrigated area of the State within the next 7 to 10 years. This increased area will make it possible for the agricultural economy to produce all foods and other staples to its fullest capacity, as well as to grow a sufficient quantity of export items to offset the ratio of the unavoidable import, necessary for maintaining agricultural production and for supplying those foodstuffs which cannot be produced in this country in sufficient quantities.

Master Plan for Developing the Water Resources

To carry out this objective a long-range master plan has been worked out for the development of those water resources that remain to be utilized. The various projects included in the master plan were divided into three groups:

a) The first group deals with the completion of the Yarkon Project, increase the use of the waters of the Jordan in the areas bordering the river, and to finish developing the subterranean waters -- particularly in the northern region and the northeastern portion of the central section.

b) The second group is aimed mainly at the fullest exploitation of the waters of the Jordan for the irrigation needs of the coastal region and the northern Negev. This will be carried out in three separate stages.

c) The third group includes the projects for the utilization of the other water resources, as well as the flood waters (particularly in the western section of the country), drainage water (after they will have been purified) and others from springs and subterranean waters.

The master plan expects to develop the water resources contained in group I within 4 years, beginning from 1959.

Among other things the first group includes two major projects (a second Yarkon-Negev line and the Kishon Valley project), a large number of medium and smaller undertakings, and completion of works now under way.

The most ambitious undertaking in the master plan is the one contained in the second group -- the utilization of Jordan's water. Under this plan 320,000,000 cubic meters of water will be diverted from the Jordan and sent by way of a canal to an artificial lake in the Bait Netufa Valley. Thence the water will flow on southward along the coastal lowlands to the northern Negev. The water will be carried by a pressure pipe whose inside diameter is 2.7 meters. The entire program will cost over L.I. 200,000,000 and its actual execution will be divided, as said, in three stages:

1) In the first stage, which will require about 4 years and an expenditure of from L.I. 130,000,000 to L.I. 140,000,000, the waters of the Jordan's reservoir installations in the vicinity of Tel Aviv. Part of the water will be used to meet the needs in the coastal region and part of it will be sent by means of another pipe running parallel to the Yarkon-Negev line on to the northern Negev. The increase of the water will reach 200,000,000 cubic meters.

The work on this portion of the Jordan project has been going on for four years and although progress is slow it goes on uninterruptingly and with increasing tempo in all the major aspects of the program. The current years appropriation for this work will reach L.I. 20,000,000.

2) The second part of the Jordan project includes the extension of the main pipeline of the Jordan approaches of the Negev, and the distribution of the water by means of secondary pipes to the entire northern Negev.

3) In the third stage all storage and distribution installations will be completed as well as all other necessary constructions, which will enable the Jordan project to reach its maximum anticipated output.

The third and last group will exploit flood waters, drainage water and the surplus of spring and subterranean waters. Their combined total adds up to an estimated 340,000,000 cubic meters. Of this total, it is proposed that about 240,000,000 cubic meters be developed within the next 10 years. The remainder should be kept in reserve.

The Prospects for the Future

Upon completion of all the projects mentioned above, in another 10-12 years, we will reach the fullest maximum exploitation of the water resources that we have. Of the total annual output of 1,800,000,000 cubic meters agriculture could receive about 1,400,000,000 cubic meters and the balance will be consumed by the urban communities and industry.

Once the agricultural economy has obtained its full required quantity as indicated, its future development will depend only upon the increasing of the crops per water unit. This will call for an especial effort by agricultural researchers in the coming years, and the quick and effective transmission of the know-how to the farmers for its practical utilization.

There are those who pin hopes on the sweetening of salty water, and especially on the desalting of sea water. From what we know today, we do not have a method which would allow the use of sea water for agricultural needs at a reasonable cost, and one cannot expect such a possibility to present itself in the next 10 years, in spite of the steady improvement in the methods known today. To be sure, as in all fields of research, some revolutionary discovery may cut the distance and bring us to our objective all at once. But a realistic approach to the problem cannot depend on hopes of this kind. Reality demands of us planning based on water that we have, and the need for general conservation in the use of water while the agricultural output per water unit is increased remains.

II. REVIEW OF ISRAELI "MASTER PLAN"

In order to bring out the plan more clearly, I shall attempt to give a picture of conditions in 1948 and in 1955 (when Cotton formulated and submitted his master plan, 7th report) and in 1965 as seen in the Cotton Report. He anticipates that the population in 1965 will reach 3,000,000.

	1948	1955	1965
Population	700,000	1,750,000	3,000,000
Irrigated land area (in dunams)	230,000	1,034,200	2,512,100
Water consumption for irrigation (in million cubic meters)	200	730	1,500
Annual income from agriculture in dollars (eggs, milk and meat not included)	--	148,200,000	281,600,000
Annual savings in dollars	--	--	72,000,000

It is worthy of note that, according to the Plan, the irrigated area will be increased while the non-irrigated seeded area will be considerably reduced and that the annual savings in foreign exchange will amount to \$70,000.00. It should also be pointed out the great strides and progress made in the difficult first seven years of statehood.

According to the Plan the water needs in 1965 will be 1,500,000,000 cubic meters, exclusive of the approximately 300,000,000 for the normal daily use of the population, industry, and for reserves. Of the possible potential of 2,000,000,000 cubic meters of water, two-thirds or about 1,300,000,000 cubic meters have already been developed to date.

Of late much is being written on Dr. Alexander Zarchin's method to desalt sea water. Characteristically, he has practically been ignored until now, leaving him to struggle with his studies and research. Suddenly a miracle happened -- an American firm found out about his patent in the United States and undertook to finance a model station

for his plan. Suddenly it was discovered that we have here in this country a Jew who has plans which may become a boon to Israel and the rest of the world and bring honor to our State. We still seem to be suffering from an "inferiority complex." But "better late than never."

Attempts to desalt water are presently being made all over the world. Some 14 or 15 different methods are being examined and tested. In this country too a number of methods are studied; for instance, the one known as the "Electro-dialysis Method" has been carefully investigated in Israel. As of today it appears that by various methods it is possible to remove the salt from sea water, wholly or partially, so that the water could be used. However, the cost is much too high to render the methods practical.

We must understand that to produce drinking water on a ship or a deserted island is not a question of cost because human lives depend on it. For its use in a modern country, however, the cost of producing such water must not exceed a certain maximum. In the case of all desalinization projects to date, high cost prevented their utilization. It seems that Engineer Zarchin succeeded in developing a process which will reduce cost to the tolerable maximum. His method of freezing the water and then to thaw it, thereby causing the water to lose all its salt or a goodly percentage of it, seems to reduce the cost to a reasonable limit. At any rate, this is the opinion of both Dr. Zarchin and the engineers of the famous American "Fairbanks-Whitney Company." The company has faith in this method and is undertaking the construction of the first experimental stations with a daily capacity of 1,000 cubic meters of water. It is yet much too soon to foretell what the results will show. We may assume even now that for distant areas, in Eilat for example, where the cost of bringing water (to the area) is prohibitive, this process will prove practical and consistent. It is possible too that practical model stations will show the way to further cut cost. It is still too early to determine whether they will be of worth also in nearby, more easily irrigated areas. The key to the success of all desalinization methods is in the possibility to cut down on the amount of energy that has to be expended in the method and the reduction in cost of that energy.

Zarchin's method makes it possible to reduce the amount of heat required in the process, that is the amount of energy, and consequently the method becomes less costly.

We hope that the political situation will change, that we shall be able to develop Israel's potential hydro-electric possibilities. Much hope is put too in the development here and elsewhere in the world of the atomic energy.

I am of the opinion that our country's source of energy lies in the strong rays of the sun of which we have such an abundance, and that the solar-energy method of desalinization of sea water is most especially suited here.

I should like to note the following: A Russian-Jewish engineer met a tragic death in Tel Aviv in 1956. He was a man of much experience in Russia. During the last years of his life in Israel he developed a method to obtain energy from the rays of the sun cheaply. He lived and worked under difficult conditions, and could not even find anyone who would listen to him. He lived to see the day when his patent was approved in Israel and registered. In the United States, however, his application is still being studied by United States Patent Office. I am inclined to believe that in his method lies the key to the solution of the problem of obtaining sun energy economically. Maybe some recognition will yet come to my tragically deceased friend when America will register his patent. His project, incidentally, is well adapted for the desalting process.

Dr. Zarchin's method will, without a doubt, bring blessing to our country and all mankind. It will help Israel materially in its acute water problem, but it will not solve it completely yet. The cost will continue to be much too high, although in the more remote areas, as in Eilath, it might be applied already.

The engineers of the American corporation who came here to work with Dr. Zarchin stated, as reported in the press, that construction would soon start of several stations, each with a daily capacity of 1,000 cubic meters. This means that three stations will be required to produce 1,000,000 cubic meters per day. To increase the potential possibilities of this country by 5%, let's say, or around 100,000,000 cubic meters, 300 such stations will be needed. The process will, however, be useful in the distant areas where it is very costly to bring water. This will particularly be the case when we will succeed in reducing the cost of power. [Mathematical computations appear inaccurate.]

At this point it should be underscored that large quantities of water are literally being wasted in this country. It is said that the consumption of water is the barometer of the cultural standing of a country. This is true insofar as the use of water goes, but surely it is not true about the useless waste of water.

III. JORDAN WATER EXPECTED IN THE NEGEV BY 1964

Even if an additional L.I. 10,000,000 were appropriated in the current (1960-61) fiscal year in order to expedite the work on the Jordan Project, known as the "National Pipeline Project," it would be impossible to advance to any appreciable degree the beginning of operation of the first stage in the utilization of the Jordan's water for the needs of southern Judea and the northern Negev. An increased budget will only insure the beginning of operation in time for the irrigation season of 1964. Without a guarantee of such additional fund it is doubtful if the Melsorot Company and Tahal will be able to meet the deadline.

Minister of Agriculture, Moshe Dayan, is wrangling with the Cabinet to get additional appropriations. His chances are good inasmuch as, according to well-founded observations, the water problem in Israel will become even more acute in the next few years.

Bottlenecks

Three bottlenecks are slowing down the completion of the Jordan Project: production of steel pipes necessary for the siphons; construction of pumping stations; and the gigantic 108 inch concrete pipes for the transporting of Jordan's water to the south. These consume most of the time in this great development plan. Given additional funds, construction of more factories would become possible and, consequently, to step up the pipe production at Ashkelon's "Yuval Gad Works," and the speeding up of pumping stations. Because of extraneous reasons, however, work on the digging of the tunnel is slow, a real factor in setting the tempo of the work.

Presently "Yuval Gad" manufactures about 17.5 kilometer 108-inch pipes annually. Additional appropriations would make it possible to produce no more than 20 kilometers.

L.I. 27,000,000

In the current fiscal year about L.I. 27,000,000 were appropriated for work on the Jordan Project. Of this amount, L.I. 14,000,000 were earmarked for the production of 14-15 kilometers of pipe in the "Yuval Gad" Works. The remaining L.I. 13,000,000 will finance the following projects:

Completing the excavating of the Jordan canal to Vait-Netufa but without cementing it. This canal will reach 18 kilometers in length. It is an open canal which will in time be cemented.

Work on the digging of the Menashe tunnel running 6.7 kilometers will be completed. This is the second in a series of tunnels in the northern part of the country, carrying water from the Jordan to the south. Another smaller tunnel digging will also start during the current fiscal year near the Menashe tunnel.

Continue, and perhaps complete plastering the Ilabon tunnel (it extends 950 meters) as they will the northern section of the Menashe tunnel.

Construction will begin on the two pumping stations which will take about two years to build. All the equipment for the first station has already been ordered in Switzerland, in the amount of approximately \$2,000,000, and will be delivered in about two years. No equipment has yet been ordered for the second pumping station.

These are the units to be completed in 1960-61 in the Jordan Project.

Work Begun in 1953

Work on the national water line began in 1953 with the excavation of the Jordan canal. In the fiscal year 1954-55 work was halted as a result of the negotiations of Eric Johnston (President Eisenhower's) emissary, who sought to find a compromise between Israel and the Arab lands relative to the exploitation of the waters of the Jordan. The Sinai Campaign that followed reduced the development work in the north to a slow pace. Only negligible sums were appropriated for the Jordan Project.

A year ago, however, when the water situation began to disturb also the Israeli politicians, the Ministry of the Treasury decided to appropriate larger sums of money. L.I. 14,000,000 appropriated in 1960-61 was indeed a significant amount and was well spent to equip the "Yuval Gad Works" to produce the gigantic pipes and to speed up the digging of the Menashe tunnel.

The First Section to be Completed in 1964

Under the present tempo of the work and the appropriations assured, Jordan's water will begin flowing to the southern part of the country around the spring of 1964. This will be the first stage of the project completed, in which 160,000,000 cubic meters of waters will be drawn from Lake Tiberias. The water will be raised to a height of 50 meters and poured into the Jordan canal, flowing on to the Ilabon tunnel. In Ilabon the water will again be raised to the Bait-Netufa elevation (150 meters) and carried via an open canal (not yet dug) from Bait-Netufa a distance of 20 kilometers, through the Emek (Valley) by the gigantic pipes, through the Menashe tunnel on to the coastal region. From there the water will be carried by pipe to Tel Aviv, and from Tel Aviv to the southern parts of the country and the northern Negev via the Yarkon-Negev line.

Southern Judea and the northern Negev will only get an additional 100,000,000 cubic meters of water when the first part of the Jordan Project is put into operation. The balance will be carried on for the consumers in the Gush Dan communities and those settlements scattered between Mt. Carmel and Tel Aviv.

The Other Sections -- Gradually

Once the first section of the Project is put in operation, others will follow gradually, ultimately to bring the maximum output of the Jordan to 320,000,000 cubic meters of water. Additional pumping installations, completion of storage facilities and the construction of a third pipeline from Tel Aviv to the Negev, in addition to the two Yarkon-Negev lines, will make it possible to complete the whole Jordan Project in 1967-68.

Until 1967, however, water experts will have to find solutions, partial ones perhaps, as to how to utilize the winter flood and sewage waters. As of today, it appears that by 1967 440,000,000 cubic meters of water will be flowing to the southern Judea and the northern Negev, coming from the following:

The Jordan	320,000,000	cubic meters
The Yarkon	50,000,000	" "
Drainage	70,000,000	" "
Total	440,000,000	" "

To be sure, the output from the Yarkon will be 120,000,000 cubic meters annually, but 70,000,000 cubic meters of this amount will go to the Gush Dan settlements.

The water will be carried to the Negev by three pipelines.

Until the first section of the Jordan Project is completed the State will have invested some L.I. 165,000,000 in that project. To complete the whole project will take little below L.I. 300,000,000.

Salinity

The salinity of Lake Tiberias will keep the experts at work for many years after the completion of the project. This year the highest salt contents known to experts has been measured in Lake Tiberias -- about 350 milligrams of chlorine to the liter of water, due to the three successive years of drought. Tahal expects to divert approximately 75,000 tons of salts a year from Lake Tiberias, perhaps even more. But research in this area is still in its beginning and one does not know what this research will lead to. Tahal officials believe that in 1964, the first year of the Jordan operations, the salinity of Lake Tiberias will be below 300 milligrams of chlorine to the liter, and that for the 10-15 years following 1964 the salinity will gradually drop, reaching 220 milligrams of chlorine per liter. The water of the Yarkon flowing into the Negev contain only 160 milligrams of chlorine to the liter.

In other words, even if Tahal should be successful in diverting the salty wells from Lake Tiberias and send the Jordan's water to the south with a salt content of 220 milligram of chlorine in each liter of water, salts which will constitute a continuous danger to the soils of the south and Negev, a soil recognized even today as the most salty in Israel. The salts which would come with the water from Lake Tiberias will render the parched soil of the south even more salty. It seems that there will be no other way out but to flow more sweet water to this region in order to wash away the salts from that soil. An excessive content of salt in soil reduces the productivity of the soil, and flushing that soil will limit revenue.

Tahal experts, however, are convinced that they will find a satisfactory solution.

How much will the water from the Jordan cost?

In the final stage, at 3.5% interest, the average cost of water, including depreciation, will be 7.5 agorot per cubic meter, in itself a very high price. Experts say that agriculture will pay 5 agorot per cubic meter, whereas urban consumers will pay the full price, and maybe even more to offset the rebate given to farmers.

IV. RECENT SYMPOSIUMS ON WATER PROBLEMS

Of all our water potential, estimated at 1,800,000,000 cubic meters annually, 150,000,000 cubic meters of saline water with a salt content of over 400 milligrams of chlorine per liter. A portion of the water is used for fish breeding.

The question of how to achieve the maximum utilization of the saline water was the subject of a symposium which opened yesterday in Bait Gordon, in Rehoboth, under the joint sponsorship of the Society for the Advancement of Science and the Agricultural Institute.

"We are already utilizing some 1,300,000,000 cubic meters of our water potential, of which about 150,000,000 cubic meters are from future reserves. If we continue to use such quantities, the sweet water may turn salty," water engineer Yaakov Vardi of the officials of Tahal declared in the opening lecture in the symposium. We will be coming near using up all our water sources. All we shall have left for exploitation will be bound up in technical and financial difficulties. In the next 7-8 years we will be using fully of all the water in the country, and any hope for new sources is dependent upon the political stabilization of this area, and the regional distribution of the waters from the Litani and Yarmuk rivers. At the same time, the speaker added, that it will be necessary to continue the geologic research by an especial technologic development. There is the possibility that new sources of water will be discovered not already included in our estimate of potential.

The water of Lake Tiberias evaporates at the rate of 280,000,000 - 300,000,000 cubic meters annually. If we should succeed in preventing some of this evaporation by covering the lake's water surface with a chemical plastic material, we could regain at least 100,000,000 cubic meters of water. Of course, this depends on whether this can be done scientifically. However, given that this is possible, the problem still remains of how to reduce the humidity and raise the temperature in the region at the same time, with the humidity there higher, as it is, than in any other part of the country.

The completion of the first stage in the Jordan Project will give us approximately an additional 300,000,000 cubic meters of water. Drainage water constitutes another source, requiring the construction of an experimental station to make this water useable. Once the Jordan Project is completed, it will be necessary to find the means of gathering the flood waters and putting the drainage water to the fullest use.

6,000 More Settlers in the Next Four Years

In the next four years we shall increase our irrigable land by half a million dunams. We shall plant another 50,000 dunams of orange groves, increase the cotton-growing area from 80,000 dunams to 100,000 dunams, the peanut area by 60,000 dunams and that of sugar beets by 40,000 dunams. The fodder-growing areas will be in keeping with the livestock demand.

A. Amir, deputy director in the Ministry of Agriculture, stated in his paper during the symposium that from the irrigated area of 250,000-300,000 dunams we had under the Mandate government, we now have 1,250,000 dunams. The value of the agricultural products last year reached L.I. 800,000,000. These products came: L.I. 100,000,000 from rain-watered areas, L.I. 350,000,000 from artificially irrigated land, and L.I. 350,000,000 from livestock.

Our artificially irrigated soil requires 1,000,000,000 cubic meters of water.

Amir added that there is presently a waste of from 15 to 20 per cent. If we could only save 10% of the water wasted, we could have an additional 100,000,000-150,000,000 cubic meters of water without added cost. Any new sources of water that may be found later are already earmarked for the new settlements, particularly in the Negev, as well as for the increased number of settlers in the already existing communities. The program, Mr. Amir said, calls for a resettlement in these communities of about 6,000 families. Once the Jordan Project is completed, 5,000-8,000 more settlers will come to live there. The irrigated area will be increased by half a million dunams, reaching a total of 2-2.25 million dunams. All this is contingent upon the amount of water saved and its effective use.

[Translator's note: The last 2 paragraphs were not included in the translation since these were excluded from the text, as indicated by the red-pencil marking.]

Deep water pumping from the wells of the coastal lowlands exceeds by much the allowable amount which is based on the annual water potential. Scores of new drillings were begun in the coastal area for this reason to attain the maximum effective use of the water by penetrating the deep sea-water. This was the statement made by Mr. Y. Cahana, engineer-director of Tahal's Department for the Development of Water Resources, at a symposium on the problems of deep-waters in the coastal lowlands, sponsored by the Society of Engineers and Architects, held in Tel Aviv's "Engineers House."

Mr. Cahana pointed out that the water potential, which replenishes itself every year in the coastal lowlands, stretching from Binyaminah to the Gaza Strip, is approximately 240,000,000 cubic meters and does not include the underground reserves. From the point of actual consumption, the problem is very grave inasmuch as the excess use is concentrated in specific areas, which, in turn, threatens the exhaustion

of the water sources in these sections to an even greater degree. The situation is particularly bad in the "Gush Dan" region. A similar observation of excess use of water was noted in Hedera, Emek Hefer, Herzeliyah, Rehoboth, Ashkelon, Bur Tuvyah and Yad Mordecai.

This conclusion was arrived at on the basis of a joint study conducted by Tahal, the Hydrological Service, the Geological Institute and the Meteorological Service.

The object of the study was to determine the water balance in the coastal lowlands, the sources of water, the nature of the stream of these waters and their emptying into the sea, as well as the possibility of including the coastal lowlands in the national water program, and the supplementing the deep waters with flood waters, drainage and other waters.

It was stated at the symposium that the excess use of water causes a situation where water penetrates subterraneously, and that unless this process is checked there is fear that that source of water will disappear.

Consequently, Tahal developed a program whereby sea-water will reach the coastal lowlands from a distance of 203 kilometers from the sea in an effort to check the stream of sweet subterranean water into the sea, and also to create a substantial reserve by filling up the cavities with salty water. This will make an increased output of sweet water possible. Such penetration of the sea-water will be achieved through scores of new drillings near the sea. A direct result of this activity will be the need to curtail some of the uses of the water from the wells located more eastwardly.

By a gradual reduction in excess water consumption and by putting the new program into effect, it will be possible, in the final stages, to continue obtaining 240,000,000 cubic meters of water annually.

The Mekorot Company has already taken the first steps in effecting this program to be carried out by the National Water Works. This program is put into law under the Water Act.

Other research papers at the symposium were read by A. Issar, an engineer representing the Geological Institute, and Sh. Ouerbach, chief of the research staff on the Coastal Lowlands.

The sessions, which lasted a whole day, were presided over by the engineers Sh. Sirkin and A. Avi-Shur.

PART II

I. NEGEV WATER DEVELOPMENT

Water Discovered in Sodom to Flood the Potash Ponds

Jerusalem, Tuesday. Drillings conducted by the "Dead Sea Works" in the Sodom area indicated the presence of a substantial quantity of water suitable for flushing the potash ponds. This was reported today by a spokesman for the Ministry of Development.

The first experimental pumping completed this week proved most satisfactory. A second drilling which will be made shortly will make it possible to determine the quantity of water that might be obtained from this well.

The water discovered was not too deep and is of relatively little saline content (less than a thousand milligrams). Once the new well begins operation, the Potash Works will have at its disposal two-thirds of the relatively sweet water it needs for flushing the potash ponds.

Under the auspices of the Dead Sea Works, Ltd., still another drilling is now being made in the Sodom region. Upon completion of the drilling program that the firm undertook, it hopes to have the full supply of water it needs for flushing purposes.

Water Springs Discovered in the Aravah

Enhance the Development of the Area

Water springs discovered in the Aravah to date will enhance the development of the region. This is the conclusion reached by Tahal's experts after two years of studying the quantities of water in the Aravah.

The water springs found in the Aravah are estimated at substantial quantities that will be available for use for decades. Tahal has a four-year program for the study of the subterranean water in the Aravah and the work to date proved that there was good reason for the continuation of the research for which an annual budget of L.I. 200,000 has been appropriated.

Granite Drilling Will Be Deepened

Tahal is planning to deepen the drilling for granite in the Aravah after an interruption of several months, it is reported. Special equipment has been ordered and upon its arrival, in the coming months, work will be resumed. The project is carried out on the assumption that down-deep in the earth may be found, in addition to rain water, also clear spring water gushing from the ground itself. There is the possibility that these subterranean streams will be found and brought up to the surface.

Tahal will attempt to undertake projects which check vaporization of lakes in Kefar Baruch and the Zohar Lake by spreading over the water a thin film of hexadecanal which is a cetyl alcohol, one molecule thick. Its chief characteristic is that it allows air to filter through but not water, thus preventing vaporization.

Prospects Good for Water Springs in Negev

Tahal, the National Water Works, after much study and testing, concluded that north of Eilath in the Aravah, there are subterranean reserves of drinking water.

This conclusion was arrived at after water had been found not far from Yatvatah, an area that was being tapped for oil. It was found that the new well produced 100 liters of water hourly, and that the degree of its salinity was 490 milligrams of chlorine per liter of water, whereas in the Tel Aviv area the salinity reaches to from 800 to 1,000 milligrams per liter.

It should be added that the spring in the Yatvatah area was found in the relatively insignificant depth of 130 meters.

An Installation for the Sweetening of Subterranean Salty Water Will Begin Operation this Month

The Institute for the Study of the Negev will begin operation within the month of a plant for the sweetening of subterranean salty water by the electro-dialysis method, under actual field conditions after prolonged studies and extended laboratory tests proved successful.

The plant is capable of sweetening 30 to 40 cubic meters of salty subterranean water per day.

The electro-dialysis method for sweetening subterranean salty water works on the principle of electric filtration of water through membranes. These membranes permit a seepage of water and certain kinds of salt but not others. Experts of the Scientific Council and the Institute for the Study of the Negev, who made a number of tests for the purpose of sweetening the salty subterranean water made modifications and changes in this method, which is known all over the world, and adapted it to local conditions. These improvements make it possible to have a continuous sweetening of water and use and cheaper cost in operation of the plant. The operation of the plant under field conditions aims to test the economic value of the installation and to determine that might arise in the process of sweetening salty subterranean water by the electro-dialysis method under actual conditions outside the laboratory.

The staff that worked in developing the plant and on the problems of desalinization by this method were R. Metz, F. Koroshi, Ch. Furgash and engineer Y. Shur.

Members of the Council and Institute are now making plans for the construction of two additional desalinization plants for the purpose of continuing the tests and studying the different problems of desalinizing subterranean water by this method.

In foreign countries the method of desalinizing water by the membrane method is well developed. In those countries sweet water is produced in large quantities at low prices.

II. LAKE TIBERIAS PROJECTS

Lake Tiberias May Serve as the Country's Main Water Reservoir

"After studies and geological tests concluded in 1954, it was concluded that Lake Tiberias may well become the country's main water reservoir; that it could hold 550,000,000 cubic meters of water annually emptied by the Jordan and the excess flood waters in rainy years." This Tahal's director A. Wiener declared yesterday in a press conference in Tiberias.

On the basis of observations in the fluctuation in the supply of water from the Jordan, it has been shown that Lake Tiberias could hold all the water flowing out from the Jordan without the necessity of elevating or changing its banks. At the same time, Mr. Wiener stated, great importance should be attached to the artificial lake at Bait-Netufa which will serve to regulate and stabilize the water fluctuations both in the Jordan and Lake Tiberias. The sealing of the Bait-Netufa lake is also satisfactory. Experiments for the construction of artificial lakes in other areas continue. Experience has shown, however, that it would take heavy investment of money to seal these lakes and, at that, it is doubtful if seepage of water could be prevented. Mr. Wiener, therefore, felt that Lake Tiberias has the advantage because of its natural state and its capacity estimated at 3,500,000,000-4,000,000,000 cubic meters. On the other hand, Lake Tiberias has some disadvantages, too: vaporization there is estimated at 260,000,000-270,000,000 cubic meters of water annually, a quantity equaling almost that of the national water system (320,000,000); also, the surface of Lake Tiberias is low (212 meters below sea level), necessitating the pumping of water and raising it more than 400 meters in order to pour it into the national water system. The greatest disadvantage, however, is the degree of salinity of the Lake Tiberias, estimated at 350 milligrams of chlorine per liter of water.

Salt in the Water of Lake Tiberias to be Reduced

The Jordan's streams into Lake Tiberias water of a low saline content of 30 milligrams. Studies and drillings have proven, however, that salty wells on the banks of the Lake and its bed add salt to its

water, "enriching" it by 130,000-140,000 tons of chlorine annually. Inasmuch as the Lake's water is intended for the irrigation of farms in the northern Negev, it is the opinion of agricultural experts that it is very important that the saline contents of the water be reduced, at least to 200 milligrams of chlorine per liter.

To achieve this, Tahal initiated about a year ago a complicated geological study aimed at locating the saline wells in the Lake and, after necessary processing, to divert them in order to reduce the salinity of the Lake's water. These wells produce 30,000,000 cubic meters of water annually with a salinity estimated at from 1,000 to 17,000 milligrams of chlorine per liter. In the course of time a number of geologic observations were made as well as seven drillings on the banks of Lake Tiberias, one of these at the bottom of the Lake. Although the study is not yet completed (it is expected that it will be concluded this year), the experts determined that most of these saline wells are located on the western banks near Tiberias' warm springs, on the northern side of the Lake, with but a few of them on the eastern bank. When the final report on this study is made, a decision will be made as to what methods to employ in order to divert these wells and remove them from the Lake. In principle, the experts suggest that the saline water be carried by pipe along the western bank of Lake Tiberias and divert them into the Jordan south of Deganiah, inasmuch as in that sector of the Jordan the water is not used for farm irrigation and no damage will consequently be caused to agriculture.

First Part of Study Evaluated

At a meeting held yesterday in the "Hamath Gardens" in Tiberias which was attended by A. Wiener, Prof. Picard of the University of Jerusalem, and other geologists and water engineers, the first part of the study of the salinity of wells in the vicinity of the warm springs of Tiberias was evaluated and plans were drawn up for the continuation of the study on the northern bank.

In answer to a question, Tahal's director said that there was good reason to expect that the first section of the national water system will be in operation in four years, a system which is based on pumping 160,000,000 cubic meters of water from Lake Tiberias annually (when completed it will be 320,000,000) which will be carried to Rosh Haayin, there to be linked to the Yarkon-Negev line. He also said that the first stage of the regional irrigation project, the Lake Tiberias-Bait Sheon line, when completed will replace the Yarmuk which the Jordanians want to divert. Mr. Wiener further stated that the restrictions in the use of water for different purposes are still in force in spite of the fact that Israel's water supply still is at an estimated 1,880,000,000 cubic meters.

Tahal Experts Locate the Wells that Salinize Lake Tiberias

Tahal experts are presently busy locating salty wells within Lake Tiberias which cause an appreciable salinization of the Lake. The experts are developing methods to remove these wells of salty water cheaply.

To date, Tahal's experts have located all the wells along the Lake which can be diverted without any difficulty via canals and pipes. However, diverting the saline wells from the center of Lake Tiberias requires much work in the "heart" of the Lake and increased expenditures. In the meantime, Tahal is operating test pumping and other experimentations in the hope of finding a solution to the problem at a relatively lower cost.

When Jordan pours its water into Lake Tiberias, it contains 30 milligrams of chlorine per liter, but because of the saline wells the average salinity in the Lake is 350 milligrams of chlorine to the liter, making its use for drinking and irrigation dangerous.

In one year 130,000 tons of salts pour in from these saline wells into Lake Tiberias. The wells along the bank produce 70,000 tons while the rest comes from the wells in the midst of the Lake.

Tahal expects her experts to come up with a solution to the problem within four months. Research in this field, however, will continue for another year and a half.

Separation of the salts from Lake Tiberias is most important in view of the fact that the Lake will serve for many years to come as the stabilizing reservoir for the national water system which calls for the transport of the water of the Jordan to the Negev.

Drill to Locate Saline Water Near Lake Tiberias

As a result of the discovery of a well of saline water near the southwestern banks of the Lake, Tahal is presently drilling in two places on the shores of the Lake, opposite Tiberias' warm springs, to determine the course of the saline well. In the near future a third drilling will begin on the banks for the same purpose. The drillings to date have already reached a depth of 25-30 meters.

The work to locate unknown saline wells concentrated south of Lake Tiberias is conducted by Tahal as part of an advance geological survey aimed at preparing Lake Tiberias as a water reservoir in the national water program (Jordan-Negev line).

The quantity of salts accumulated in Lake Tiberias in a year from bad water seepage and from saline wells reaches 80,000 tons. In order to keep the salinity of Lake Tiberias from rising to an excessive degree when the national pipeline is put in operation, a number of the saline wells in Lake Tiberias will be diverted to the southern tributary of the Jordan where it leaves the Lake.

Pumping Station Opened at Lake Tiberias

Tel Aviv, Wednesday. The Water Department of the Agency for the Northern Sector this week started operation of a pumping station on Lake Tiberias which will supply 200 cubic meters of water to the Migdal settlement. The project cost L.I. 30,000.

This station will pump water from Lake Tiberias into a pool with a capacity of 1,500 cubic meters. As a result of the added water supply, each of the new settlers will be given additional ground to the limit of 10 dunams for farming.

Hitim's Water Works -- to "Mekorot"

The new water works at Hitim, which supplies 560 cubic meters of water per hour, will be transferred to Mekorot for operation, inasmuch as its operation by the communities proved to be a difficult undertaking in that it necessitated a special supervisory and collection agency which, in turn, increased the cost of the water.

The drilling of the two wells by the Agency's Water Department involved an expenditure of nearly L.I. 500,000. The communities receiving water from these sources hope that a new scale of charges for water consumption will be effected presently.

III. YARKON WATER PROJECTS

Speed-up in Laying Negev Pipes for Water to Reach There by Summer, 1961

Tahal and Mekorot will step up the laying of water pipes in the second Yarkon-Negev line in order to start the flow of water by the first section of the line running for about 40 kilometers, bringing additional water to the southern settlements and the Negev by summer, 1961.

The pipe will carry from 4,000,000 to 5,000,000 cubic meters of water coming from pumps set up in the coastal region and the south.

Tahal and Mekorot plan to lay a pipe which will carry water from the coastal area to the communities in Torshiha region. These communities have not had any increase in their water quota for a long time, in fact, the supply even dropped because of the thinning out of the wells. The goal is to begin by transmitting at first 3,000,000 cubic meters annually and subsequently increase the quantity to 7,000,000 cubic meters. The water will start flowing in the summer of 1961.

In the Haifa-Kishon area drilling will be started Kavri (?) and Wadi Keren near Acre. The capacity of Lake Kishon will also be enlarged by 3,500,000 cubic meters. In the enlarged lake 12,000,000 cubic meters could be stored, of which about 10,000,000 will be put to

use. The water is gathered in the lake during the winter when the demand is small and used in the summer when consumption is at a peak. Enlargement of the lake will also increase considerably the supply of water to the Valley of Jezred and the Laonach area. It is also planned to link Haifa with the western Galilee-Kishon 30-inch pipeline.

In Lower Galilee a project will be completed this year which will bring water from Lake Tiberias to the area's communities, sending 10 cubic meters of water hourly. In the Bait Sheon Valley work will continue to ready the southern canals to supply water to the manufacturing and development villages in the area. Numerous other drillings will be made in different parts of the country.

Yarkon Water to the Negev and to Gush Dan

"One inundation from the Yarkon will not improve but worsen the situation. On the other hand, a continuous inundation for a full week is impossible because the water is needed for irrigating the Negev farms and for the consumption of the residents in the Gush Dan," declared Mr. Z. Kariv of the Mekorot Company. He explained that because of the severe drought 350,000 cubic meters of water are drawn from the Yarkon in a single 24-hour period, of which Gush Dan alone consumes 90,000 cubic meters.

It is reported that for the past 111 years an accurate record of precipitation in Israel has been kept. There hasn't been a year matching the current one in the scarcity of rain. The precipitation in the Yarkon basin this year, for example, has been only 25-30 per cent of the area's annual average.

Engineer M. Yavov of the Ministry of the Interior discussed the plans of the commission for easing the situation in the Yarkon area.

IV. GALILEE WATER DEVELOPMENT

Water Found in Western Galilee

Water aplenty, suitable for drinking as well as irrigation, was found during Mekorot drillings in Western Galilee near Acre. A test pumping this week brought 500 cubic meters of water per hour, dropping the water level only 60 millimeters. According to Mekorot circles it will be possible to obtain even more water from this well, as high as 800 cubic meters per hour. This will constitute a significant increase in water for those living in the area.

It is reported that workers of "Solel-Boneh" are near completing the plastering job of the Ilavon Channel, which is nearly 800 meters long.

Mekorot is also continuing digging of the southern section of the Menashe Tunnel which, in this area, reaches a depth of 1,900 meters. In the northern sector they have already excavated 2,700 meters but work was discontinued when work was begun in the southern sector.

Lower Galilee Communities Await the Water Works

Tiberias, Monday. The communities of Lower Galilee are looking forward to the beginning of operation of the water works from Lake Tiberias to Lower Galilee, as promised last year by the former Minister of Agriculture, and for which L.I. 1,250,000 of the development budget for 1959-60 were appropriated to start the work on it. The implementation of the plan has not begun as yet.

M. Fultheim, coordinator of the agricultural committee for water in Lower Galilee's regional council, told our reporter that the council was planning to lodge an urgent plea with the Ministry of Agriculture to have the work begun promptly. He added that the plans for this project were drawn up in 1957. The details, too, have long been completed. A total of L.I. 6,000,000 to L.I. 7,000,000 will be expended on this project and will supply 10,000,000 cubic meters of water annually. Work will take three years. Seven communities in Lower Galilee will benefit from the project: Shadmoth Devorah, Bait-Kesketh, Sedai-Ilan, Segerah, Kefai Tabor and the Kadouri Agricultural School.

These communities presently consume 1,500,000 cubic meters of water. Recently a water project intended for these communities was completed at Kefar Kisch. This one, however, did not increase the amount of water, it only made up the shortage created by the discontinuation of the supply of water from Yavriel on account of the drop in the water level due to the drillings. The Water Authority urged the reduction of water consumption from 2,700,000 cubic meters annually to 2,100,000.

Plan to Supply Pure Drinking Water to Huleh Communities

A program for the furnishing of drinking water to the farmlands of Amir, Kefar Blum, Neoth Mordecai and Sedai Nehemiah, was submitted today to the representatives of the Upper Galilee's regional council, at the request of the council by engineers A. Bolsha and Z. Yalon.

These farmlands for the last 15-20 years have been using polluted Jordan water causing the farmers different diseases.

The program, which will require an expenditure of L.I. 500,000, proposes to lay a net of pipes from Nahal Dan to these communities.

The regional council urged the Ministries of the Interior and of Health to carry out and finance the program.

To Restrict Use of Water in Gush Dan

Water Authority circles indicated that the total amount of water allowable to all of Gush Dan will not exceed 30,000,000 cubic meters annually.

Gush Dan now uses from 40,000,000 to 50,000,000 cubic meters a year. In addition, Mekorot supplies another 40,000,000 cubic meters of water. The excess use causes increased salinization of existing wells and a drop in the level of the subterranean waters.

Supply of Water from Radioactive Well to Migdal Colony to be Stopped

As a result of a high concentration of radon gas which produces a radioactivity 15 times more than safe for human use, discovered in the Muduarah Spring which supplies water to the Migdal colony in the Galilee, consideration is now being given to opening a new local well and to discontinuing the use from the above-mentioned spring. Scientific studies conducted by the Weizmann Institute with the Muduarah Spring showed at the time a high concentration of the said gas, one of radium derivatives and three other derivatives of an identifiable element of radiation of the alpha-beta rays.

Water from this spring, supplying 300 cubic meters hourly, serve the Migdal colony for drinking and irrigation purposes. The concentration mentioned does not constitute an immediate danger to the human body. However, an accumulation of the factors mentioned can cause trouble.

At one time it was proposed to bring into use a nearby well, abandoned because to make it useable would involve an expenditure of L.I. 40,000. It was therefore tabled. Now, however, as a result of the publicity due to the discovery of radioactivity, the Ministry of Health invited Migdal's local council to recommend the amount of money necessary to activate the well not presently in use.

Water Found in En Kerem, Near Jerusalem

Water drilling by Mekorot near the dam in En Kerem, led to the discovery of water springs producing 2,500 cubic meters every 24 hours. This was announced last evening by Mayor M. Ish-Shalom of Jerusalem, at a meeting of the municipal council.

Mekorot decided to start other drillings, and experts are optimistic about the prospects of finding more water in the area. The mayor stressed that, insofar as Jerusalem is concerned, which until now has been dependent for water to be brought in from outside its limits, this is an historic event.

At that session the construction of another pool was authorized for Jerusalem, one of a series of small pools to be built in a number of localities. The first pool, which will cost around L.I. 60,000, will be built in Gonen, and two others elsewhere in the city.

The municipal council approved construction of two new school buildings in Jerusalem, the Hayim Arlazorov Elementary School and the "Ba Maaleh" School. The construction will cost about L.I. 500,000.

At the opening of the session, the Mayor extended his sympathy to councilman H. Marinov upon the death of his mother in Russia.

Kishon Project Nears Completion

The Kishon project, the western Galilee section of the national water system, is nearing completion.

All farms of the area have finally been linked with the main line and are receiving 20,000,000 cubic meters of additional water for agricultural purposes. These farms also use 24,000,000 cubic meters of water reaching them from other sources, mainly from their own drillings.

The total consumption of water in western Galilee is presently 44,000,000 cubic meters annually, or 75% of the area's quota.

Work on National Pipeline to be Resumed

At the end of this month Mekorot will resume work on the 108-inch pipeline interrupted at the beginning of the winter, as will be recalled because of rain and mud.

The company to date has put in place 9.5 kilometers of pipes in two sections, 5.5 kilometers in the Zofith-Ramat Hakovesh-Kifar Tirah and 4 kilometers in the Maanit-Southern Taqun sector. 5.5 kilometers more of line was laid along the "Tawii" (?). Mekorot will first start on the Maanit-Southern Taqun section, and at the same time will resume all other local and national projects discontinued for the winter.

In fiscal year 1960-61 it is expected that 17 kilometers of the 108-inch pipe will be manufactured, which will carry Jordan's water to the south.

Paving the Ilavon Channel

Next week "Solel-Boneh" will begin paving the Ilavon Channel. The special equipment has already been set up and the arrival of an expert from abroad to do this type of work is now being awaited.

V. NATIONAL WATER REQUIREMENTS

Mekorot Water Supply Increases 70,000,000 Cubic Meters

In fiscal year 1960-61 the water supplied by Mekorot Company will increase by 70,000,000 cubic meters to 510,000,000 compared with 440,000 cubic meters last year.

This report was made by Zeev Kariv, of the Mekorot Company, at a press conference in Bait Sokolow in Tel Aviv, adding that actually Mekorot will supply also this year over 500,000,000 cubic meters of water, even though the quota was set at 440,000,000 cubic meters.

Mr. Kariv stated, under the direction of the Ministry of Agriculture, consumers on the northern borders of the country will be required to reduce the use of water by 10-20 percent of their maximum consumption last year, due to the drought. Reduction in quantity used by consumers in the Galilee will run from 10 to 15 percent, while that of consumers in the southern part of the country will be cut by 5 percent.

Mr. Kariv pointed out that, for the first time, Mekorot will this year maintain a continuous flow of water for the settlements of Lower Galilee and 5,000,000 cubic meters of water for the paper factory in Hedera.

The Company's expenditures in the new fiscal year will jump from L.I. 21,000,000 to L.I. 24,500,000.

As for the interruption of water service for a number of communities in the Negev, Mr. Kariv revealed that the Company was compelled to do it in view of the fact that on 1 March of this year consumers in the area owed the Company L.I. 4,000,000.

The Country's Water Consumption Rises More Than 20%

Statistics show that water consumption in the State during 1959 jumped from 20-25 percent compared to previous years.

According to the figures the total consumption of water in the State for the year 1959 will be 1,300,000,000 cubic meters. The figure for last year was the same as this year, but it should be borne in mind that last year was a drought year. Water consumption in 1957 was 1,030,000,000 cubic meters.

The noted rise in the consumption of water brought great concern again to the various water control authorities. These circles emphasize the necessity for water conservation inasmuch as the State's water resources are most meager.

It is clear that, in spite of the introduction of water meters in a number of cities, consumption there did not fall off because of that. The reason, it is believed, is that consumers have not as yet begun to be billed according to the meter readings. It should be noted the rates for water consumed rises gradually in proportion to the consumption.

The country's water agencies call for the expansion of the Ministry of Agriculture's "Field Service" which acquaints agricultural settlements with the proper methods of irrigation and water conservation. To date, private farms which constitute a substantial percentage of the country's agriculture, have not been included in this service. The present budget of the "Field Service" is close to L.I. 450,000, an amount which will obviously have to be increased.

VI. APPROPRIATIONS FOR WATER PROJECTS

Fund to Regulate Water Consumption

Starting today Mekorot will collect .4 of an Agorot on each cubic meter of water in the city and .2 of an agorot in villages.

As of today, Mekorot will increase the cost of a cubic meter of water for agricultural needs by 2/10 of an Agorot and 4/10 of an Agorot for urban and industrial use. This money will go into a fund created by the Ministry of Agriculture for the purpose of regulating the consumption of water. This was revealed yesterday by Yehiel Dievdvani, general director of Mekorot, and Zeev Kariv, the Company's manager, at a press conference in Tel Aviv.

The fee will be a permanent increase in the cost of water.

The new fund was created this week by Minister of Agriculture, Moshe Dayan, after consulting with M. Levi Eshkol, Minister of the Treasury. The purpose of the fund, according to the spokesman, is to serve as a deterrent against the fluctuations in the supply of water as affected by rainfall. Only the Bait Sheon area was excluded from the new increase.

Mekorot has already contributed to the fund out of its profits, nearly half a million Israeli pounds. Should the Company meet the full demand of its consumers in 1960-61, the fund will be augmented by about L.I. 450,000 by the end of 1960-61. By far the greatest amount of the L.I. 450,000 will be borne by the three major cities -- nearly L.I. 350,000.

Questioned by Haaretz' reporter, Mr. Kariv replied that he thought that the increase should not be made to apply to the consumers in Tel Aviv inasmuch as the municipal government pays to Mekorot 3.5 Agorot per cubic meter of Yarkon water and sells it for 12.20 and even 30 Agorot per cubic meter.

Mr. Kariv stated that water rates generally will not be increased this year. During the new fiscal year the Company will collect L.I. 21,500,000 for the 500,000,000 cubic meters of water it will supply (instead of the 440,000,000 cubic meters in 1959-60). Its expenses, however, will be L.I. 24,500,000. The deficit will be met through the following sources: about L.I. 900,000 from the Electric Co. as a rebate, some L.I. 200,000 from a negligible increase in rate for consumers who now pay 40 prutot per cubic meter and will from now on pay only 1/10 of an Agorot more, and L.I. 2,000,000 from government subsidies.

Shutting Off Water -- A Necessity

In answer to questions Mr. Kariv repeatedly emphasized that "even in drought seasons Mekorot has no other alternative than to discontinue service to consumers who do not pay their bills." Mr. Kariv

related that almost 95% of such discontinuation of water service occurred in the southern part of the country, but not until after his Company sends three warnings in advance and then waits 5 more months for the payment of the bills. When it becomes clear that the bills are being ignored, "we are forced to shut off the water. Some 40 such interruptions in service take place monthly. As of 1 March 1960 consumers owed Mekorot nearly L.I. 4,200,000. The speaker indicated that the three major cities were "all right" and that "we have no complaint against them."

During the new fiscal year the Company will furnish some 40,000,000 cubic meters of water to the communities of Gush Dan. Of this amount, Tel Aviv alone will receive about 35,000,000 -- the amount carried to the area in 1959-60. Beginning at once, all the communities of the Dan region will get their water from Mekorot, not only Tel Aviv. This water will come from the Yarkon springs in Rosh Haayin to the municipalities.

Discussing the problems of supplying water to the various regions Mr. Kariv said:

In the northern part of the country Mekorot will reduce the supply of water to its consumers by 10-20 percent, as directed by the Ministry of Agriculture.

Eastern, central and western Galilee have been linked to new supply installations -- Dishon and Rosh Hamabua. It is possible that the Company will succeed in overcoming the chronic water shortage in that region.

For the first time Lower Galilee Heights farms will get from the Company 600,000 cubic meters of water instead of the 1,200,000 they asked for. The supply will not come from Lake Tiberias, since that project is still in the planning stage.

In the western Galilee-Kishon region, water supply will be reduced by 10-15 percent. In the lake of Kefar Baruch only 4,000,000 cubic meters of water accumulated instead of 47,000,000.

The last drilling for the paper factory in Hedera is nearing completion. It will get this year 5,000,000 cubic meters of water.

In Emek Hefer an improvement has been effected in the water level by a refilling process of the wells that was made during the winter, in spite of the drought and shortage of water.

The supply of water south of the Yarkon will be reduced in the spring by 5%, based on the month of the maximum consumption by the farms a year ago.

In the Zohar Lake in Lachish only 6,500,000 cubic meters of water accumulated instead of 9,500,000, and the quantities of water sent to the lake to replenish it are growing steadily lower due to the hot climate which requires a continuous flow of water to the Negev.

The successful drilling in En Kerem already is supplying 90 cubic meters of water hourly and a new drilling will soon begin.

In the Har Hanegev project, farms are this year getting three times as much water as they had been getting until now. Upon completion of the installations, more water will flow to Dimonah, to the industrial factories in that area and to Sedai Bokair.

Answering a question, Mr. Kariv said that his Company has paid to the government L.I. 1,700,000 in interest this year. It also paid the government L.I. 3,500,000 on the principal. All together, Mekorot owes the government L.I. 150,000,000. About 50% of this sum, however, is government shares (which controls a third of the company). The Company is to pay the government 3.5% interest beginning with the fourth year, or 17 interest payments in 20 years.

L.I. 50,000,000 Budget for Mekorot for Development of Water Resources in 1960-61

In the fiscal year 1960-61 Mekorot's budget for the development of water resources will be L.I. 50,000,000, representing the Company's largest annual appropriation in its history. During the year 17 kilometers of 108-inch pipe will be manufactured and put in place. It is expected that by summer 1961 water will flow by this pipe to Rosh Haayin, and from there on via the second Yarkon line to the southern communities and the northern Negev. This was revealed to our reporter by Mr. Duvdmoni, general director of Mekorot.

The major expenditures of Mekorot this year will be as follows: the Jordan Project - L.I. 29,000,000; L.I. 4,600,000 for national projects; L.I. 2,100,000 for the Har Ha Negev project; L.I. 5,600,000 for the second Yarkon line, and L.I. 9,200,000 for various local projects.

Also to continue will be the excavation work on the Menashe Tunnel, as well as the paving of the Ilavon Tunnel. Digging of the canal at Hukuk, too, will be carried forward and new pumping stations erected. The saline subterranean wells flowing into Lake Tiberias will be diverted; water will be brought to the farms of the Jordan Valley east of the Geshar-Zemach road following the Yarkmok bend by the Jordan. Additional 12 kilometers of pipe will be laid in the second Yarkon line which, by the end of fiscal year 1960-61, will reach a length of 42 kilometers. Mekorot this year will supply to its customers a total of 509,000,000 cubic meters of water.

Substantial Cut in Appropriations for Development of Water Resources

Contained in the proposed budget for the fiscal year 1960-61 is a substantial cut in the appropriations for developing new water resources, as well as in the work on the national water system and the diversion of the water of the Jordan. The reduction exceeds L.I. 18,000,000 resulting in a reduction of the amount earmarked for water sources development from L.I. 50,000 to about L.I. 32,000,000. This our reporter learned from economic circles in Jerusalem.

As will be recalled, the Ministry of Agriculture asked for an appropriation also in 1960-61 of about L.I. 64,000,000 for development of new water sources, included in which was L.I. 27,000,000 for the continuation of the work on the national water system. Official of the Treasury, however, rejected this request on the ground that application will shortly be made to the World Bank for a loan of L.I. 60,000,000 for the purpose of completing the national water system, and that, therefore, there is no need for an additional appropriation above that set aside in the budget for development purposes.

As we learned from Water Authority circles, the proposed Treasury budget aroused great perplexion and in a conference with Minister of Agriculture, Moshe Dayan, a number of suggestions were made aimed at taking drastic steps to remove the cut in appropriations and to ensure that the amount earmarked for development of new, additional water sources will not be reduced but will remain the same as last year.

No Changes in Personnel

Minister of Agriculture, Moshe Dayan, is not planning any changes in the structure of the Ministry of Agriculture, and none of the senior officials will be replaced. The only change is that A. Ofer was appointed as deputy director general for economic affairs and will handle such matters that were previously under the jurisdiction of the deputy Minister of Agriculture, Zeev Zur. Press officer Yaakov Breger, has long asked to be relieved from his duties in order that he might devote his time to the organization and centralization of the Manufacturing and Marketing Council. Complying with the request, Gad Yaakobi, secretary to the Minister of Agriculture, took on this assignment, too (press officer). Yitzhak Levi, general director of the Ministry of Agriculture, will remain on his post contrary to all rumors that he would be replaced, which were emphatically denied. Aryeh Amir, deputy director general also will continue on his post, as will A. Ben-David, deputy director-general for administrative matters.

Previously discussion was held with Ariel Amiad to accept a major post in the Ministry of Agriculture. It was finally decided, however, that Amiad should continue in the Settlement Department of the Jewish Agency and to represent his department in the central organization for agricultural training.